

# ***NOAA Integrated Ocean and Coastal Mapping***

***“Map Once.....Use Many Times”***

***South Carolina Ocean Mapping Workshop  
24 April 2008***



***Roger L. Parsons  
NOAA IOCM Coordinator***


# ***Ocean and Coastal Mapping***

*The **acquisition** of physical, biological, geological, chemical, economic and archaeological characteristics and boundaries of ocean and coastal areas, resources, and sea beds through the use of acoustics, satellites, aerial photogrammetry, light and imaging, direct sampling, and other mapping technologies; the **management** and **dissemination** of these data; and the **development** of mapping technologies, tools and products*

# ***Integrated Ocean and Coastal Mapping***

*The practice of acquiring, managing, integrating and disseminating ocean and coastal geospatial mapping data **in such a manner that permits these data and their derivative products to be easily accessed and used by and for the greatest range of users and purposes.***

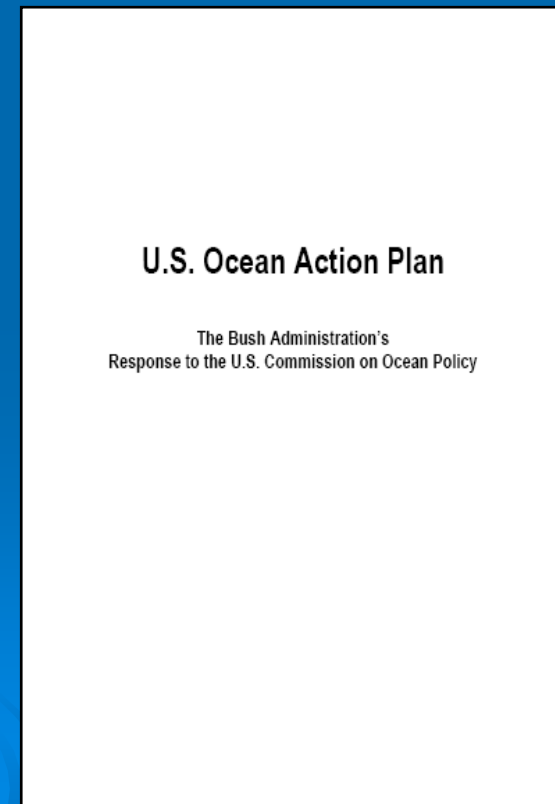
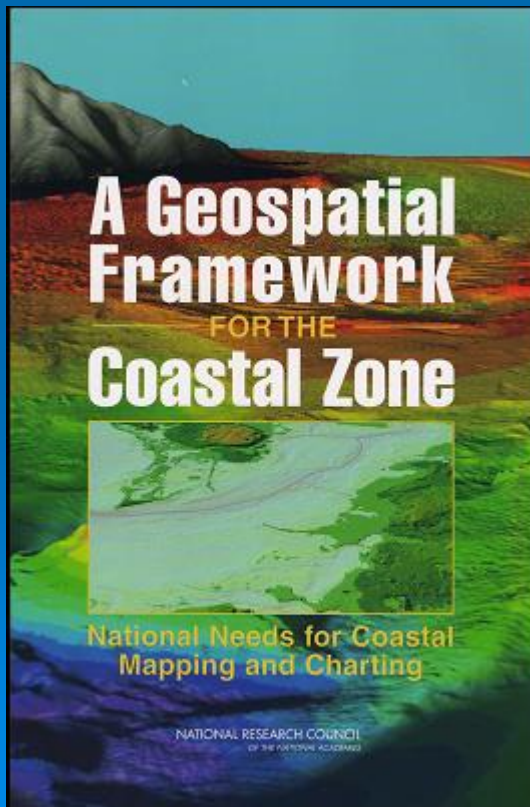
*IOCM requires intra- and inter-agency coordination with a focus on streamlining operations, reducing redundancies, improving efficiencies, developing common standards, and stimulating innovation and technological development.*



# ***National Research Council Study (2004)***

## ***U.S. Ocean Action Plan (2005)***

***“Coordinate Federal Ocean and Coastal Mapping Activities”***



# National Research Council Assessment

## User Community Common Needs

- **Consistent spatial framework** for coastal data that allows a seamless transition from onshore to offshore
- **Increased collection and availability of data** including land cover, shallow-water bathymetry, seafloor imagery, habitat distribution and classification standards, etc.
- **Easy access** to up-to-date digital, geospatial data, imagery and mapping products
- **Compatibility** among data formats - or standards and transformation protocols that allow easy data exchange - and a means to evaluate data accuracy
- **Increased inter- and intra-agency coordination**, cooperation and communication

# U.S. Ocean Action Plan

- Develop an **annual inventory** of Federal, Federally-funded, and non-Federal governmental ocean and coastal mapping programs and operations
- Assess and report on **common and shared needs** for development of coordinated programs
- Coordinate and **leverage resources and efforts across the Federal sector** with industry, academic, NGO, and non-Federal government entities
- Set priorities for **standards development** and developing strategies for promulgation of standards for data acquisition, data, metadata, tools and products
- Develop **shared and standardized mechanisms** for processing, archiving, and distributing geospatial data, tools, products and services

# WHY IOCM?

- *Federal, State and local governments and private sector users require access to accurate ocean and coastal geospatial data and products*
  - *Mapping resources are limited*
  - *Coordination of efforts, leveraging of capabilities, standardization, etc. are the keys to “mapping once and using many times”*
  - *Intra- and inter-agency coordination is essential*
  - ***IOCM is a smart business practice***
- 

# ***Federal Ocean and Coastal Mapping Agencies***

## ***DOI***

*U.S. Geological Survey  
Minerals Management Service  
Bureau of Land Management  
U.S. Fish and Wildlife Service  
National Park Service*

## ***DOC/NOAA***

*NOAA Ocean Service  
NOAA Fisheries  
NOAA Satellite and Information Service  
NOAA Research  
NOAA Marine and Aviation Operations*

## ***DOD***

*U.S. Army Corps of Engineers  
Nat'l Geospatial-intelligence Agency  
CNMOC/NAVOCEANO*

## ***DHS/FEMA***

***EPA***

***NASA***

***NSF***



# ***NOAA Mapping Authorities***

- *Magnuson-Stevens Fishery Conservation and Management Act*
- *Coral Reef Conservation Act*
- *National Marine Sanctuaries Act*
- *Coastal Zone Management Act*
- *National Coastal Monitoring Act*
- *Marine Protection, Research and Sanctuaries Act*
- *National Invasive Species Act*
- *Marine Debris Research, Prevention, and Reduction Act*
- *Harmful Algal Bloom and Hypoxia Research and Control Act*
- *Titanic Memorial Act*
- *Hydrographic Services Improvement Act*
- *Coast and Geodetic Survey Act of 1947*

# ***Pending IOCM Legislation***

***H.R. 2400** (Ocean and Coastal Mapping Integration Act) and  
Title III (Ocean and Coastal Mapping Integration) of **S. 39**  
(National Ocean Exploration Program Act)*

- *Codifies recommendations of NRC Assessment and Ocean Action Plan*
- *Establishes an Interagency Committee on Ocean and Coastal Mapping*
- *Establishes a NOAA Integrated Mapping Initiative*
- ***Neither of these Acts would supersede/alter existing Federal agency mapping authorities***

# ***NOAA OCM Activities***

- *Nautical Charting*
- *Shoreline Mapping*
- *Cadastral and Boundary Mapping*
- *Coastal Hazard Assessment and Ecosystem Restoration*
- *Benthic and Coral Habitat Mapping*
- *Coastal Topography and Bathymetry*
- *Storm Surge/Flood Inundation/Sea Level Rise Modeling*
- *Living/Non-living/Archeological Resource Inventories*
- *Land Cover and Coastal Vegetation Mapping*
- *Coastal Change Analysis*
- *Tide/Water Level Observations*
- *Integrated Ocean Observing System (IOOS)*
- *OCM Data Management (National Data Centers)*
- *Ocean Exploration*

# ***JSOST Interagency Working Group on Ocean and Coastal Mapping***

- *Co-chaired by USACE, USGS, MMS and NOAA*
- *Facilitates -*
  - *coordination of Federal/Federally-supported OCM activities*
  - *coordination and leveraging of resources across the Federal sector and with State, industry, academic and NGOs*
  - *development and maintenance of OCM Inventory*
  - *prioritization of standards development and strategies for promulgation of standards for data acquisition, metadata, tools and products*
  - *assessment of mapping R&D needs*

# ***Ocean and Coastal Mapping Inventory***

- *Interagency effort to improve the efficiency of the Nation's ocean and coastal mapping activities*
- *The Inventory –*
  - *a **clearinghouse** for OCM geospatial mapping data and interpretive information*
  - *a **registry** of planned, current and completed Federal mapping activities (to be expanded to State and local activities)*
  - *will be built within **Geospatial One-Stop** Web portal*
  - *will facilitate the leveraging of mapping of Federal mapping resources*
  - *will minimize redundant data acquisition efforts*
  - *will maximize the discoverability of OCM geospatial data*

# ***National OCM Strategic Action Plan***

*Three broad areas were identified as needing community-wide attention over the next 5 years:*

***Tool Development*** – *identify and develop tools required to promote the efficient and effective advancement and application of OCM to support informed decision making.*

***Ocean and Coastal Mapping Community Building*** - *increase awareness and build advocacy and support for the implementation of Integrated Ocean and Coastal Mapping in order to maximize National mapping efficiencies.*

***IOCM Model for Success*** – *develop a scalable project-oriented model of IOCM that demonstrates the benefits of an integrative and collaborative approach to ocean and coastal mapping.*

# ***IOCM Opportunities***

***Project** - California Seafloor Mapping Project (FY08-09)*

***Location** – CA coastal area from 10m depth to 3 Nm seaward (7500 km<sup>2</sup>)*

***Partners** –*

*State of CA (CA Coastal Conservancy, CSUMB, CA Geological Survey)*

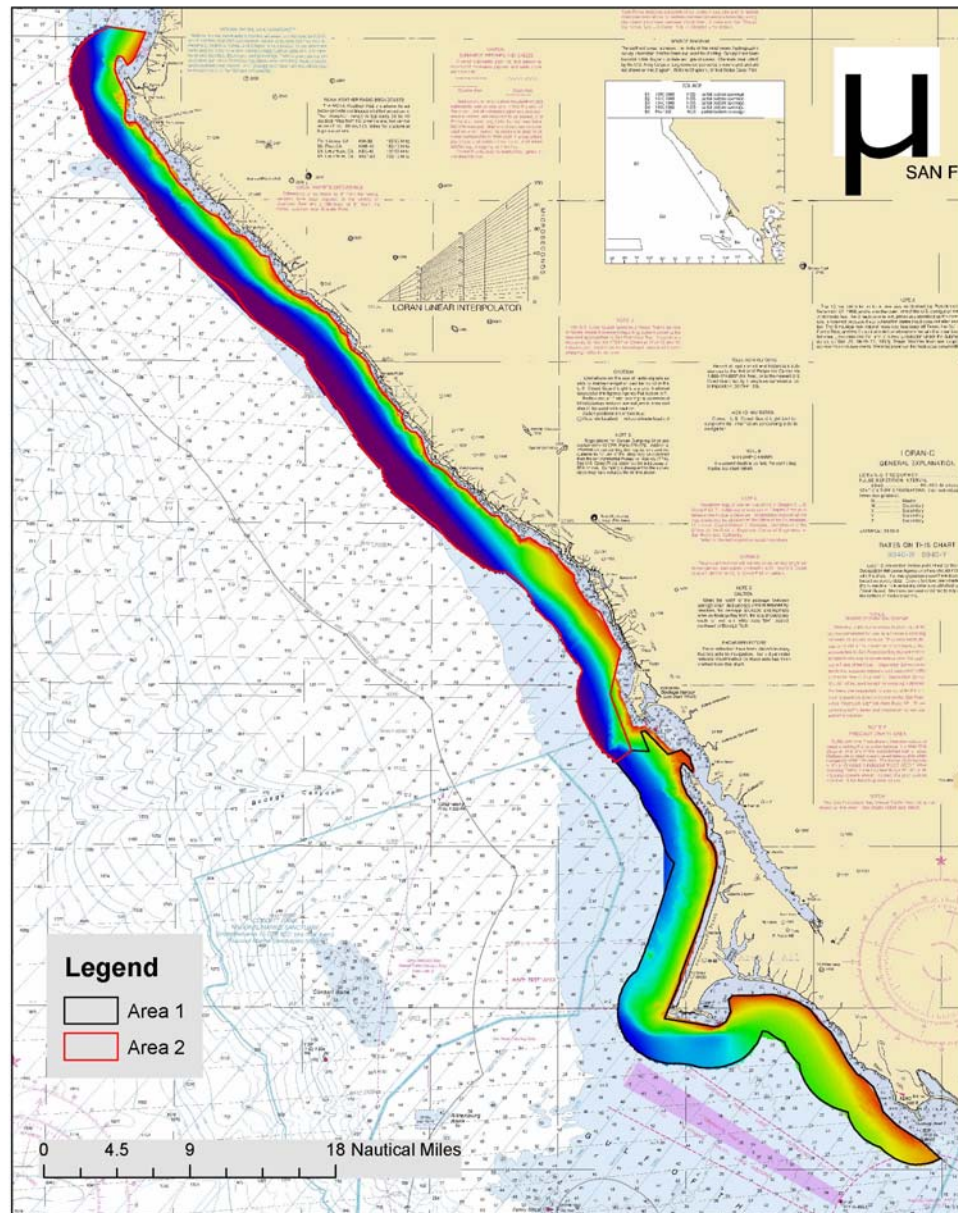
*Feds (USGS, USACE and NOAA)*

*NOAA (OCS, NMSP, CSC, NGDC, NMFS/Office of Habitat Conserv.)*

***Data** – acoustic and lidar bathymetry, acoustic backscatter, geological and biological ground-truthing, habitat characterization data*

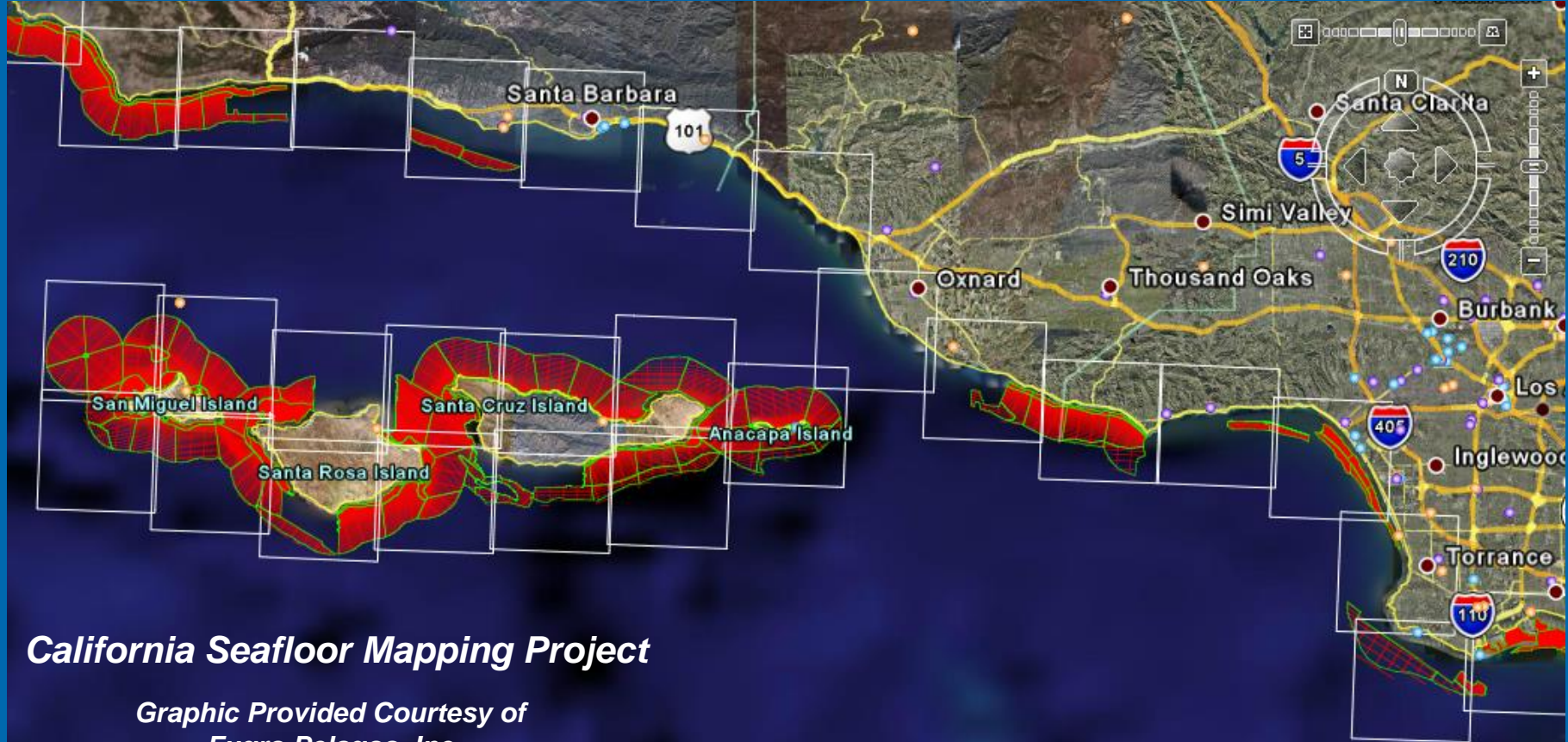
***Products** - coastal/habitat base maps to support ecosystem-based resource management, updated nautical charts*





**Graphic Provided Courtesy of Fugro Pelagos, Inc.**





## California Seafloor Mapping Project

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Fugro Pelagos, Inc.



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# ***IOCM Opportunities***

***Project** – North Carolina Integrated Coastal Mapping Project (FY08)*

***Location** – NC coastal area from Cape Hatteras to Currituck Banks  
NERR Site (1500 km<sup>2</sup>)*

***Partners** –  
State of NC (NC NERR, NC DOT, NC Office of Emergency Mngmn't)*

*NOAA (NGS, CSC, OCS, OCRM, CO-OPS, NCCOS)*

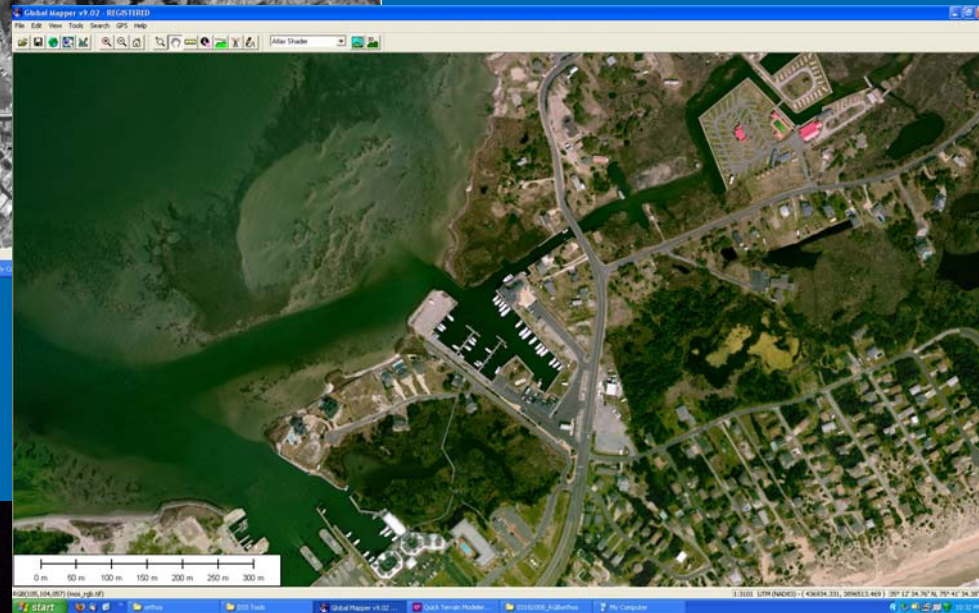
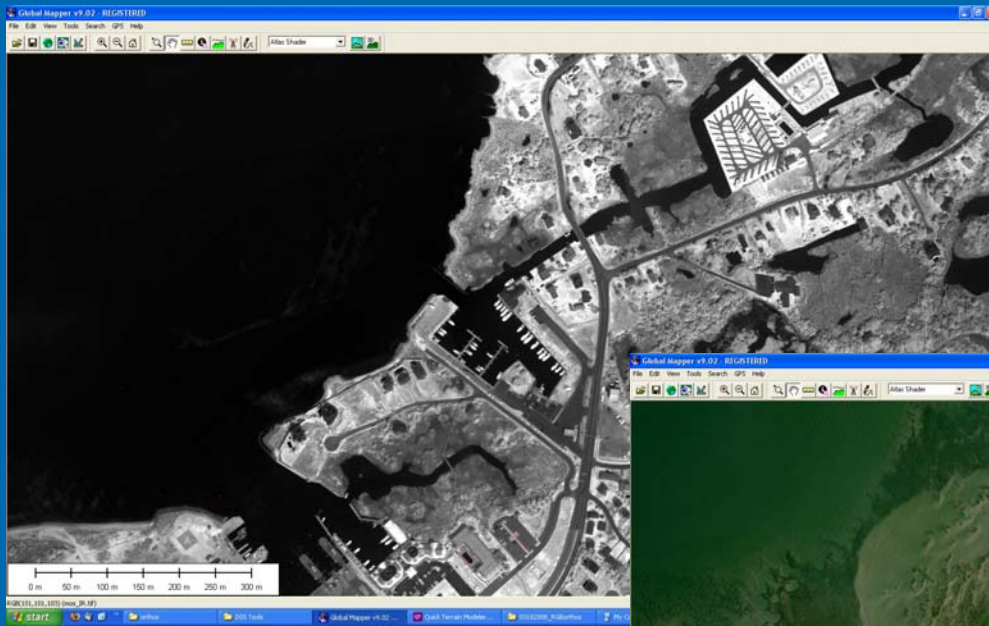
*Other Feds (USACE and FEMA)*

***Data** – high-res topography and bathymetry, high-res aerial imagery  
including multi-spectral, habitat characterization and ground-truthing data*


***Products** - coastal orthophotos, shoreline maps, habitat classification  
maps, updated nautical charts*



# North Carolina Integrated Coastal Mapping Project



# *Role of the Private Sector*

- *Private sector role in **data acquisition and product development** is essential – Federal efforts alone cannot address all that needs to be accomplished*
  - *Participation in IWG-OCM and proposed Interagency Committee on OCM activities, as appropriate*
  - *Leaders in developing and evolving **mapping technologies***
  - *Development of **data dissemination and analysis tools** and value-added remarketing of data*
- 

# WEST COAST GOVERNORS' AGREEMENT on OCEAN HEALTH

CALIFORNIA OREGON WASHINGTON

## Draft Action Plan

October 19, 2007

Deadline for submitting public comment:  
December 1, 2007

### West Coast Governors' Agreement on Ocean Health Draft Action Plan

#### Seafloor Map Applications

In addition to supporting research and management of living marine resources and providing baselines for monitoring change, seafloor maps can:

- Support the prediction of hypoxia and recurring "deadzones" (Priority 1)
- Locate submerged debris or cultural resources (Priorities 1, 2)
- Increase the knowledge base for essential fish habitats and other key habitats (Priorities 2, 3, 6)
- Assist in siting offshore infrastructure, such as pipelines, energy facilities, communication cables, and ocean observatories (Priorities 4, 6, 7)
- Give insight to shoreline processes and impacts from storms (Priority 7)
- Support tsunami, storm surge, and earthquake hazard assessments (Priority 7)

#### Status of Seafloor Mapping in Washington

To date, a number of sections of the Washington margin have been mapped at various resolutions by different organizations (e.g., Oregon State University, NOAA, and the U.S. Navy). Presently there is an agreement between NOAA and the U.S. Navy that regulates the acquisition, control, and dissemination of high-resolution bathymetry data within a security zone off Washington and northern Oregon. Over the past several years, habitat mapping has been a high priority for Washington and for coastal treaty tribes. There are also ongoing efforts to complete high-resolution maps for small, isolated areas within sections of Puget Sound through collaborations between academia and state and federal agencies. In addition, the NOAA Olympic Coast National Marine Sanctuary is working to map all waters in its jurisdiction; however, at current rates, it does not expect to finish the effort until 2043.

#### Status of Seafloor Mapping in Oregon

In 2006, over twenty Oregon-based marine scientists signed a Scientific Consensus Statement for Mapping the Oregon Territorial Seafloor. In 2007, a legislative effort to fund seafloor mapping was initiated by the universities, which ultimately did not succeed. To date, a number of sections of the Oregon margin have been mapped at various resolutions primarily by Oregon State University and NOAA, and additional mapping is ongoing on a limited basis by Oregon Department of Fish and Wildlife (DFW) in state waters. In total, less than five percent of Oregon's territorial sea (within the three nautical mile limit) has been mapped. However, competing ocean uses coming to the forefront in Oregon (e.g., energy, aquaculture) have recently highlighted the need for a complete map of the seafloor, and another legislative effort is anticipated for the 2009 session.

#### Status of Seafloor Mapping in California

Currently, approximately 33% of California's territorial sea and offshore waters has been mapped at various resolutions by a combination of academic and federal agencies. The state

many of the Agreement's seven priorities. There are a large number of complementary areas and management issues that would be served by mapping bathymetry and marine habitats along the West Coast.

Three of the primary challenges associated with completing a seafloor map for the West Coast are identifying and securing funding sources to get comprehensive seafloor mapping accomplished, developing uniform mapping standards within and across the three states; and designing and completing a uniform map product. The status of seafloor mapping in each state is described in the following paragraphs.

### West Coast Governors' Agreement on Ocean Health Draft Action Plan

#### Seafloor Mapping

##### Finding 6C

Mapping the entirety of the state waters off the West Coast will provide critical information for protection of ecosystems and economic infrastructure.

The availability of a comprehensive high-resolution bathymetric map for the West Coast is a limitation to addressing priority areas for both state and federal agencies. The states' efforts would benefit greatly from removal of present restrictions on accessibility of seafloor mapping data and improving overall data availability. Completion of a high-resolution, bathymetric map will aid the three states' efforts on tsunami modeling, habitat characterization and identification, spill tracking, alternative energy site selection, and other high priority management issues. Completing comprehensive seafloor maps will require a combination of state and federal resources; in particular, support from USGS and NOAA, and possibly contribution from other partners such as the private sector.

#### Actions

##### Regional Marine Research

##### Action 6.1

Support the West Coast Sea Grant regional marine research needs process by identifying funding sources and partners for a sustained approach to ocean and coastal research.

The three states are participating in developing a regional ocean and coastal research plan led by the West Coast Sea Grant institutions. While the Sea Grant process will take a longer time to fully develop, the three states have identified some regional priorities of concern. The states will prioritize and pursue joint efforts to fund regional scientific research projects where pooled resources or coordinated efforts will maximize the return on research investments to benefit all three states. In addition, the states will work with the four existing ocean observing systems collaborations along the West Coast, federal agencies, tribes, and academia to invest in monitoring to address priority issues. Initial regional priorities identified include harmful algal blooms, hypoxia, aquatic invasive species, ocean energy, and climate change.

Timeframe: The Sea Grant Regional Research Plan is anticipated for release in fall 2008. Other timelines may be identified in the final action plan.

#### Seafloor Mapping

##### Action 6.2

Complete a seafloor map of the bathymetry and habitat of all state tidelands and submerged lands out to three miles.



# Scientific Consensus Statement for Mapping the Oregon Territorial Seafloor

For Oregon, as for most coastal states, the sea represents both a valuable resource and a potential threat. The sea provides many Oregonians with a livelihood, food, and recreation, and it attracts visitors to our coastal communities. The sea also represents a significant threat in the form of an inevitable earthquake-generated tsunami, akin to the recent one in Indonesia.

Understanding the nature of Oregon's Territorial Sea is critical to sustaining sport and commercial fisheries, coastal tourism, and a broad range of other ocean derived ecosystem services valued by Oregonians, in addition to addressing the threat posed by a major tsunami.

Presently, we have detailed bottom mapping of only about 5% of the area of the Oregon Territorial Sea, which extends 3 nautical miles from the coast and comprises approximately 950 square nautical miles. Effective decisions concerning the management and conservation of ocean resources and the modeling of shoreline inundation and erosion from storm waves or a tsunami all depend upon better knowledge of the nearshore waters.

This consensus statement expresses the belief that completing seafloor mapping of Oregon's coastal nearshore ocean is of the highest priority. We, the undersigned academic and government agency scientists, urge State and Federal officials to support and expedite ocean floor mapping of Oregon's territorial sea within the next two years. Oregon Statewide Planning Goal 19 (12/1/2000) calls for stewardship and conservation of ocean resources in Oregon's Territorial Sea. This consensus statement is consistent with and inspired by Goal 19.

Seafloor mapping of the Oregon continental margin is presently underway through a variety of efforts. However, the nearshore area is commonly left out due to the difficulty of mapping in shallow waters and insufficient resource allocations. As a group of leading scientists engaged in all aspects of study of our coastal ocean, we

urge an initiative to map the seafloor of our coastal territorial sea. The costs are not excessive (under \$6 million), and the benefits are inestimable. Presently, there is no State or Federal agency charged with this responsibility. Over the last several years, new sonar technologies, and the associated data management infrastructure, have moved what was once prohibitively expensive within our reach. Nevertheless, current efforts to accomplish this important work are insufficient. Without a coordinated effort, it will take 50 years or more at the present rate of progress. This pace is much too slow to meet the needs of coastal erosion studies, tsunami planning and resource management decision-making.

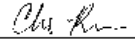
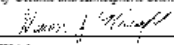
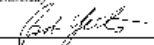
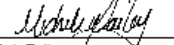
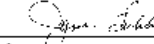
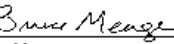
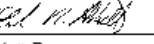


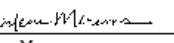
Specifically, we recommend mapping of the seafloor of the Oregon Territorial Sea for the following reasons:

- Oregon, along with Northern California, Washington, and Vancouver Island, faces a 20% probability of experiencing a magnitude-9 subduction earthquake and tsunami in the next 50 years, much like the 2004 disaster in Indonesia. We are just now beginning to understand what this disaster will mean for the Oregon coast. For the many towns along the coast, we presently cannot say how far the waters will rise, because the modeling of tsunami waves depends on detailed knowledge of coastal water depths that presently does not exist. Managing the hazards posed by this inevitable geological event requires this knowledge.
- We now understand that many Oregon nearshore fisheries and other marine life are dependent upon spatially explicit, yet limited, habitat features. Describing and classifying nearshore habitats are essential components of effectively assessing and managing Oregon's marine resources, including nearshore fish populations for both the Federal Essential Fish Habitat and State nearshore management processes.

continued on back

- Governor Kulongoski has tasked the Oregon Ocean Policy Advisory Council (OPAC) with further developing and advising him on two challenging spatial management topics. First, is the continuation of the 2002 OPAC recommendation for a limited system of marine reserves within Oregon State waters to evaluate their efficacy in meeting nearshore conservation and management goals. Second, in December 2005, the Governor proposed the establishment of a National Marine Sanctuary off the Oregon coast, and has tasked OPAC with identifying and evaluating information and issues to guide this proposal. A detailed seafloor map depicting geologic and habitat features is essential as a scientific support tool for discussion and informed decision-making

We, the undersigned, urge the implementation of an Oregon state waters seafloor mapping plan to support the resolution of these issues at the earliest possible time. This consensus group has already outlined a working plan to utilize idled fishing vessels staffed by university, State and Federal agency scientists. Efforts supported by NOAA to augment those already made by ODFW will begin in Summer, 2006.

 Chris Goldfinger College of Oceanic and Atmospheric Sciences, Oregon State University	 Chris Romsos Department of Geosciences, Oregon State University	 Andy Lanier Michels Dailey
 Dawn Wright Department of Geosciences, Oregon State University	 Bob Yeats Department of Geosciences, Oregon State University	 Bruce Menge Department of Geosciences, Oregon State University
 Mark Hixon Department of Geology, Oregon State University	 Jane Lubchenco Department of Geology, Oregon State University	 Sherman Bloomer, Dean College of Science, Oregon State University
 Scott Heppell Department of Fisheries & Wildlife, Oregon State University	 Selena Heppell Department of Fisheries & Wildlife, Oregon State University	 Dave Fox Marine Resources Program, Oregon Department of Fish & Wildlife
 Dan Cox Coastal and Ocean Engineering Program, O.H. Hinsdale Wave Research Laboratory, Oregon State University	 Harry Yeh Coastal and Ocean Engineering Program, O.H. Hinsdale Wave Research Laboratory, Oregon State University	 Arlene Merems Solomon Yim
 Vicki McConnell State Geologist and Director, Oregon Department of Geology and Mineral Industries	 Selena Heppell Department of Fisheries & Wildlife, Oregon State University	 Arlene Merems Solomon Yim

February 22, 2008

The Honorable Peter DeFazio  
United States House of Representatives  
2134 Rayburn House Office Bldg.  
Washington, DC 20515

Dear Congressman DeFazio:

I write to ask for federal appropriation requests for the 2009 Fiscal Year Appropriations bills. The requests I highlight below merit your particular attention as they will help advance our joint efforts to move the state's economy forward or otherwise result in substantial benefits to Oregonians. In addition to my support for the state agency requests included in this letter, I will be writing independent letters in support of a select number of other very deserving appropriations requests that have been submitted to the delegation by entities other than Oregon state agencies.

I look forward to working with you on these funding requests for Oregon as the Congressional appropriations process proceeds. I welcome any questions or concerns you may have. If you have questions about any of the submissions outlined below, please contact my Chief of Staff, Chip Terhune, at 503.373.1565 ([Chip.Terhune@state.or.us](mailto:Chip.Terhune@state.or.us)).

#### County Payments

I appreciate the delegation's dedication to the continuation of the Secure Rural Schools and Community Self Determination Act. Clearly, the funding provided by this Act is critical to our ability to continue rebounding from a deep recession. We need the continued support, commitment and partnership from the federal government to ensure all of our communities benefit from a strong economy. The elimination of the Secure Rural Schools and Community Self Determination Act would default on the 100-year-old federal commitment to our rural communities and hurt thousands of Oregonians who depend on these payments to keep their communities strong and stable. I thank you for your attention to this important effort.

The Honorable Peter DeFazio  
February 22, 2008  
Page Six

The Portland region is uniquely qualified to become an international leader in green business. Portland is known as an international leader in sustainable practices, encompassing public policies, clean energy and green building businesses, and strong consumer demand for green alternatives.

Thank you for your assistance in helping Oregon state agencies and other organizations obtain federal funding for these important projects.

Sincerely,

  
THEODORE R. KULONGOSKI  
Governor

The Honorable Peter DeFazio  
February 22, 2008  
Page Three

#### COMMERCE, STATE AND JUSTICE

**Pacific Coast Salmon Recovery Fund (PCSRF): \$90,000,000 national; \$12,000,000 for Oregon**

Oregon needs this funding to support and match grants to local groups and landowners to implement projects to recover salmon and steelhead and improve the habitat needed for their survival and recovery. The funds will contribute to the support of the organizational capacity of local watershed councils, who are key implementers of voluntary restoration projects with private landowners. The funds will also support grants to provide monitoring, technical assistance, assessments, and education and outreach related to salmon recovery. Over the years, Oregon's share of PCSRF has ranged from a high of \$17 million in FY 2002, to a low of \$6.4 million (\$4.3 million after earmarks) in FY 2006.

#### DOGAMI Oregon Territorial Sea Mapping: \$4,000,000

DOGAMI is the geological science agency for Oregon. Their mandate is to map the geology of the state to identify and mitigate geological hazards including tsunamis, earthquakes, landslides, and volcanoes, find geological resources including groundwater. Presently, we have detailed bottom mapping of only about five percent of the area of the Oregon Territorial Sea, which extends three nautical miles from the coast and comprises approximately 950 square nautical miles. A detailed map would enable more effective tsunami modeling, wave energy facility siting, telecommunications cable laying, marine habitat identification and shoreline erosion modeling, to name a few.

#### ENERGY AND WATER

There are a number of very worthy projects occurring in Oregon that fall under the jurisdiction of the federal Energy and Water Appropriations bill. I have highlighted a number of them below for which the Oregon Department of Energy is the primary fund recipient. In addition, in these distinct projects, I certainly continue to support important on-going projects such as the clean-up of Hanford, funding for the State Energy Program, as well as funding for LIHEAP.

#### Christmas Valley Renewable Energy Development: \$410,000

The Oregon Department of Energy works to ensure Oregon has an adequate supply of reliable and affordable energy, to develop clean energy resources and to promote renewable resources. The U.S. Air Force owns the Air Combat Command Radar Transmitter in Christmas Valley and is interested in finding an alternative use for the site, which has massive electrical transmission 115 kV lines and support infrastructure. It is large enough to develop significant solar, wind, and possibly geothermal-generated power. This project is to conduct assessments that will lead to renewable energy development and take advantage of the existing infrastructure.

## NOAA Hydrographic Survey Priorities - East Coast

2007

### Legend

#### Critical Areas Remaining

4,421 Total Square Nautical Miles

High Commercial Traffic Volume  
Inadequate Charts  
Compelling Request  
Extensive Petroleum/Hazmat material transport  
Low Under Keel Clearance

#### Priority 1

7,254 Total Square Nautical Miles

Navigation Significant: < 20 fathom depth  
Survey vintage pre-1940  
Petroleum transport > 1,000,000 tons  
or Coal transport > 600,000 tons  
or Chemical/Waste transport > 100,000 tons  
or Cargo > 5,000,000 tons  
or Passenger transport > 10,000

#### Priority 2

5,843 Total Square Nautical Miles

Navigation Significant: < 20 fathom depth  
Survey vintage pre-1940  
Not Priority 1

#### Priority 3

15,775 Total Square Nautical Miles

Navigation Significant: < 20 fathom depth  
Survey vintage pre-1970  
Not Priority 1 or Priority 2

#### Priority 4

14,639 Total Square Nautical Miles

Navigation Significant: < 20 fathom depth  
Survey vintage 1970-1993

#### Full Bottom Coverage Era

5,458 Total Square Nautical Miles

Completed Critical/Navigationally Significant Areas  
Survey vintage post-1993

### Navigationally Significant Areas



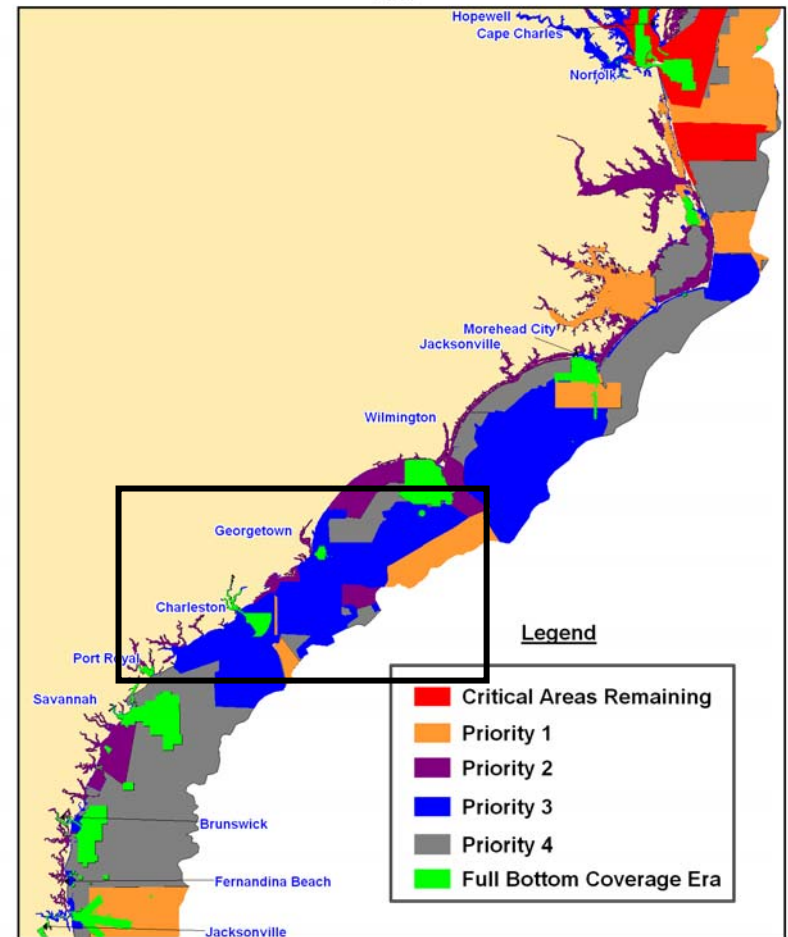
#### Re-survey Areas

4,354 Total Square Nautical Miles  
(Separate Area Insets)

## NOAA Hydrographic Survey Priorities - East Coast

Southeast States

2007





***Map Once.....Use Many Times***

